Technical Paper 107

UNIVERSITY LIBRARY
SEP 8 1915
PRINCETON, N. J.

DEPARTMENT OF THE INTERIOR
U. S. BUREAU OF MINES
JOSEPH A. HOLMES, DIRECTOR

PRODUCTION OF EXPLOSIVES IN THE UNITED STATES

DURING THE CALENDAR YEAR 1914

WITH NOTES ON COAL MINE ACCIDENTS DUE TO EXPLOSIVES

COMPILED BY

ALBERT H. FAY

WASHINGTON
GOVERNMENT PRINTING OFFICE
1915

Generated on 2024-09-28 15:23 GMT / https://hdl.handle.net/2027/njp.32101054990427
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Digitized by Google

Original from
PRINCETON UNIVERSITY

The Bureau of Mines, in carrying out one of the provisions of its organic act—to disseminate information concerning investigations made—prints a limited free edition of each of its publications.

When this edition is exhausted copies may be obtained at cost price only through the Superintendent of Documents, Government Printing Office, Washington, D. C.

The Superintendent of Documents *is not an official of the Bureau of Mines.* His is an entirely separate office and he should be addressed:

SUPERINTENDENT OF DOCUMENTS,
Government Printing Office,
Washington, D. C.

The general law under which publications are distributed prohibits the giving of more than one copy of a publication to one person. The cost of this publication is 5 cents.

First edition. July, 1915.

Generated on 2024-09-28 15:27 GMT / https://hdl.handle.net/2027/njp.32101054990427
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from PRINCETON UNIVERSITY

CONTENTS.

	Page.
Introduction	5
Classification of explosives	5
Acknowledgments	6
Scope of statistics	6
Mine accidents due to explosives	7
Production and distribution of explosives—Coal-mine fatalities	7
Publications on explosives and accidents therefrom	15

TABLES.

TABLE 1.	Amount of explosives manufactured in the United States and used in the various States during the calendar years 1912, 1913, and 1914	8
2.	Amount of black blasting powder used in the United States during 1913 and 1914	10
3.	Amount of high explosives used in the United States during 1913 and 1914	11
4.	Amount of permissible explosives used in the United States during 1913 and 1914	12
5.	Yearly sales of short-flame explosives used in coal mines in the United States, 1901–1914	13
6.	Quantity of permissible explosives used in different coal fields in the United States, 1910–1914	13
7.	Coal-mine fatalities due to explosives during 1912, 1913, and 1914	13
8.	Fatalities in coal mines caused by explosives	14

Generated on 2024-09-28 15:24 GMT / https://hdl.handle.net/2027/njp.32101054990427
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from PRINCETON UNIVERSITY

PRODUCTION AND DISTRIBUTION OF EXPLOSIVES IN THE UNITED STATES DURING THE CALENDAR YEAR 1914, AND COAL-MINE ACCIDENTS DUE TO EXPLOSIVES.

Compiled by ALBERT H. FAY.

INTRODUCTION.

The total production of explosives, excluding the amount exported, in the United States during the calendar year 1914, according to figures that the Bureau of Mines has received from manufacturers, was 450,251,489 pounds (225,126 short tons), as compared with 500,015,845 pounds (250,008 short tons) in 1913 and 489,393,131 pounds (244,696 short tons) in 1912.

The production for 1914 is segregated as follows: Black powder, 206,099,700 pounds; "high" explosives other than permissible explosives, 218,453,971 pounds; and permissible explosives, 25,697,818 pounds. These figures represent a decrease of 23,839,831 pounds of black powder; 23,932,573 pounds of high explosives, and 1,987,952 pounds of permissible explosives as compared with figures for 1913.

As explosives are essential to mining and the use of improved types of explosives tends to lessen the dangers attending this industry, the Bureau of Mines has undertaken the compilation of information showing the total amount of explosives manufactured and used in the United States, its first report, Technical Paper 69, dealing with the year 1912, and the second, Technical Paper 85, with the year 1913. The report for 1914 is therefore the third paper of the series.

CLASSIFICATION OF EXPLOSIVES.

The production figures tabulated herein are classified as follows:

1. *Black blasting powder.*—All black powder with sodium or potassium nitrate as a constituent is here classified as black blasting powder.

2. *High explosives.*—Dynamite and all other high explosives of various trade names and compositions, except permissible explosives, are put in this class.

3. *Permissible explosives.*—In this class are included ammonium nitrate explosives, hydrated explosives, organic nitrate explosives, and certain nitroglycerin explosives containing an excess of free

Generated on 2024-09-28 15:25 GMT / https://hdl.handle.net/2027/njp.32101054990427
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from PRINCETON UNIVERSITY

water or carbon. All permissible explosives have passed certain tests of the Bureau of Mines, and are not to be regarded as permissible unless used in the manner specified by the bureau.[a]

ACKNOWLEDGMENTS.

The Bureau of Mines takes this opportunity to express its appreciation of the aid rendered by the manufacturers in furnishing the data compiled, and to Mr. C. C. Quincy, secretary of the Institute of the Makers of Explosives.

SCOPE OF STATISTICS.

Table 1 shows, for the calendar years 1912, 1913, and 1914, the quantity of explosives used in those States wherein three or more manufacturers reported sales. States in which only one or two manufacturers reported sales were not segregated.

Tables 2, 3, and 4 give the total production and uses, by groups of States, of black powder, high explosives, and permissible explosives, respectively. The States are so grouped as to include regions where the general conditions of mining are more or less similar and yet to avoid publishing sales of individual companies.

Table 5 shows the rapid increase in the production and sale of permissible explosives. In 1902 only 11,300 pounds of permissible explosives were used in coal mining, whereas in 1913 the quantity so used had risen to 21,804,285 pounds, falling to 19,593,892 pounds in 1914. The decrease in the total amount of permissible explosives used in coal mining in 1914 is about 10 per cent as compared with 1913, and is in harmony with the smaller production of coal.

The quantity of permissible explosives used in the United States is larger than in a number of foreign countries. In 1912 it represented about 5 per cent of the total quantity of explosives produced and in 1914, 5.7 per cent. The total amount of explosives used for the production of coal in 1914 was 220,622,487 pounds, of which about 8.9 per cent was of the permissible class as compared with 9.5 per cent in 1913.

Table 6 gives the quantities of permissible explosives used for mining coal in the various coal fields. The table shows that in 1914 about four-fifths of the permissible explosives manufactured were used for coal mining, the remaining 6,103,926 pounds being reported under the items "Other mining" and "All other purposes," as shown in Table 4.

---

[a] Hall, Clarence, Snelling, W. O., and Howell, S. P., Investigations of explosives used in coal mines, with a chapter on the natural gas used at Pittsburgh, by G. A. Burrell, and an introduction by C. E. Munroe: Bull. 15, Bureau of Mines, 1912, 197 pp.

Hall, Clarence, and Howell, S. P.: Tests of permissible explosives: Bull. 66, Bureau of Mines, 1913, 313 pp.

Generated on 2024-09-28 15:28 GMT / https://hdl.handle.net/2027/njp.32101054990427
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from PRINCETON UNIVERSITY

The figures for 1914 tabulated in this paper represent the reports of 41 manufacturers who operated their plants during the year. The number of manufacturers reporting sales of black powder was 29, of high explosives 29, and of permissible explosives 19. A number of other companies reported their plants as having been idle during the year or as having been sold to other manufacturers.

The reports of manufacturers of fireworks and of ammunition are not included, inasmuch as the majority of these manufacturers purchase their explosives from one or more of the manufacturers of explosives.

MINE ACCIDENTS DUE TO EXPLOSIVES.

Table 7 shows the number of fatalities due to the use of explosives in the coal mines for the years 1912, 1913, and 1914.

Table 8 shows, for the periods indicated, that 3,661 men have been killed in the coal mines since the beginning of inspection service in the various States. The fatalities shown in this table are classified in 14 groups, from which it appears that nearly 18 per cent of the fatalities occurred during the handling and transportation of explosives and approximately 25 per cent may be grouped as due to premature blasts and short fuse.

In this table some of the causes overlap slightly. For example, "Returned too soon," "Flying pieces of rock or coal," "Delayed blast," and "Suffocation by powder gases," might all properly be classified as "Returned too soon." However, in compiling the table the statement made by the inspector in his report on the fatality has been taken as the guide for classification. Of fatal accidents from flying pieces of coal or rock, some may have been due to the miner returning too soon and others to the miner not getting far enough away or not having proper shelter near the working face.

It will be noted that comparatively few fatalities at coal mines are caused by thawing of explosives, and still fewer to unexploded charges in coal and débris. The total number of fatalities due to shots breaking through pillar or rib is 220.

The fatalities caused by explosives at metal mines were 78 for 1911, 94 for 1912, and 89 for 1913. The fatalities at quarries for the same years were 50, 47, and 44, respectively.

The use of permissible explosives in coal mining has unquestionably resulted in lessening risks, and few, if any, of the serious mine disasters can be attributed directly to their use.

PRODUCTION AND DISTRIBUTION OF EXPLOSIVES—COAL-MINE FATALITIES.

The production and use of explosives in the United States are given in detail in Tables 1 to 6 following. Statistics on fatalities in coal mines from their use are given in Tables 7 and 8.

Generated on 2024-09-28 15:27 GMT / https://hdl.handle.net/2027/njp.32101054990427
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from PRINCETON UNIVERSITY

Generated on 2024-09-28 15:28 GMT / https://hdl.handle.net/2027/njp.32101054990427
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

TABLE 1.—*Amount of explosives (excluding exports) manufactured in the United States and used in the various States during the calendar years 1912, 1913, and 1914.*

[Figures for 1913 revised from statement in Technical Paper 85, Bureau of Mines.]

State.	1912			1913			1914		
	Black blasting powder.	High explosives other than permissible.	Permissible explosives.	Black blasting powder.	High explosives other than permissible.	Permissible explosives.	Black blasting powder.	High explosives other than permissible.	Permissible explosives.
	Kegs.	*Pounds.*	*Pounds.*	*Kegs.*	*Pounds.*	*Pounds.*	*Kegs.*	*Pounds.*	*Pounds.*
Alabama	211,095	4,542,192	3,856,130	204,151	5,573,850	4,396,667	178,689	3,921,685	3,171,697
Alaska	(a)	(a)	(a)	(a)	3,571,470	.....	(a)	(a)	.....
Arizona	(a)	(a)	(a)	30,550	8,731,335	.....	9,346	7,986,113	(a)
Arkansas	111,072	1,169,946	(a)	107,679	1,240,465	4,300	88,363	1,137,869	(a)
California	(a)	(a)	(a)	182,974	12,048,102	(a)	110,418	10,344,833	(a)
Colorado	106,732	7,268,790	656,858	82,542	7,760,280	684,687	82,472	7,165,230	812,550
Connecticut	36,853	677,759	5,600	2,994	710,518	(a)	1,888	751,265	(a)
Delaware	(a)	79,426	.....	(a)	(a)	(a)	(a)	(a)	.....
District of Columbia	.....	(a)	.....	(a)	(a)	.....	.....	15,250	.....
Florida	3,678	1,770,182	(a)	1,518	2,187,268	.....	991	1,935,619	.....
Georgia	27,797	1,238,907	(a)	23,524	1,178,770	.....	16,706	785,471	(a)
Idaho	11,848	3,749,470	(a)	11,502	3,995,415	(a)	6,566	3,676,450	.....
Illinois	1,466,972	5,879,767	746,094	1,294,282	6,689,690	1,578,925	1,205,636	6,260,121	1,344,375
Indiana	500,141	2,634,435	(a)	543,212	2,452,364	81,750	508,226	2,619,206	90,623
Iowa	347,335	1,439,367	(a)	310,206	1,921,721	(a)	346,910	1,846,192	27,650
Kansas	450,502	2,417,112	63,350	466,244	3,293,798	32,275	503,688	3,105,531	(a)
Kentucky	257,406	2,629,495	292,933	279,964	3,687,345	467,550	302,772	2,258,712	550,600
Louisiana	(a)	877,813	(a)	(a)	1,146,162	(a)	(a)	822,974	(a)
Maine	6,289	666,305	.....	6,693	831,484	(a)	3,907	755,895	.....
Maryland	26,018	1,248,727	14,450	37,966	1,475,214	(a)	23,422	1,476,686	11,450
Massachusetts	5,066	1,579,630	(a)	8,636	1,497,992	(a)	6,561	1,432,825	(a)
Michigan	21,769	23,694,970	(a)	25,148	21,818,795	(a)	31,371	20,812,133	(a)
Minnesota	221,989	10,647,442	(a)	(a)	11,105,635	.....	140,834	9,072,006	(a)
Mississippi	522	521,215	.....	4,572	693,523	(a)	2,213	745,630	.....
Missouri	173,310	17,262,890	(a)	172,866	15,712,677	(a)	156,118	13,962,593	324,100
Montana	132,212	(a)	(a)	109,969	8,751,955	(a)	86,397	6,842,101	(a)
Nebraska	6,099	217,310	.....	4,713	263,450	(a)	4,001	219,110	.....
Nevada	(a)	(a)	(a)	(a)	6,836,785	(a)	16,179	5,792,895	(a)
New Hampshire	2,047	266,503	.....	644	172,550	.....	1,026	156,050	(a)
New Jersey	(a)	1,976,054	(a)	4,477	2,175,336	(a)	6,347	2,187,358	(a)
New Mexico	47,130	1,798,225	(a)	45,662	1,955,230	(a)	58,516	1,874,677	(a)
New York	37,045	14,474,767	196,375	38,802	12,519,410	(a)	31,313	10,050,483	(a)
North Carolina	25,133	1,358,762	(a)	32,480	1,670,475	10,000	11,270	1,952,940	(a)
North Dakota	13,160	197,275	(a)	11,578	287,600	(a)	12,950	291,394	(a)

Digitized by Google
Original from PRINCETON UNIVERSITY

Generated on 2024-09-28 15:24 GMT / https://hdl.handle.net/2027/njp.32101054990427
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Ohio	302,628	6,639,698	36,550	347,374	7,272,123	20,600	246,727	8,815,955	30,775
Oklahoma	207,683	1,687,862	350,200	182,927	2,134,864	354,800	187,935	2,269,729	387,455
Oregon	(a)	4,070,160		(a)	4,538,430		29,006	4,578,205	(a)
Pennsylvania	2,887,996	32,059,187	8,108,612	2,843,343	36,532,915	9,836,050	2,720,550	34,808,704	9,208,600
Rhode Island	(a)	197,350	(a)	341	81,075		(a)	52,800	
South Carolina	(a)	340,327		(a)	483,030		449	287,445	
South Dakota	4,180	1,756,515		(a)	1,937,305		5,497	2,032,826	
Tennessee	186,268	3,824,012	198,790	263,035	4,575,107	226,337	126,035	3,389,283	124,938
Texas	81,031	1,750,382	27,131	69,105	1,681,600	(a)	53,459	1,226,391	(a)
Utah	62,073	4,385,460	(a)	136,098	5,721,925	3,963,700	21,519	3,297,570	(a)
Vermont	13,602	270,250		11,790	331,450		10,004	213,025	
Virginia	156,189	3,012,704	134,900	182,740	3,569,293	160,650	124,293	3,261,091	510,450
Washington	(a)	7,117,330	(a)	60,077	8,610,471	(a)	(a)	8,093,036	(a)
West Virginia	505,926	4,323,135	3,072,095	668,884	4,534,400	3,498,460	611,817	4,122,230	3,236,099
Wisconsin	10,012	5,303,415	143,150	5,528	5,876,207	(a)	6,775	5,972,077	13,029
Wyoming	123,131	199,275	95,700	105,824	461,735	258,650	102,435	449,407	229,550
Not segregated	421,650	45,247,664	6,631,352	274,967	87,940	2,110,369	39,391	3,326,900	5,623,877
Total	[b] 9,211,735	234,469,492	24,630,270	[b] 9,197,581	242,386,544	27,685,770	[b] 8,243,988	218,453,971	25,697,818
	[c] 230,293,369			[c] 229,939,531			[c] 206,099,700		
Grand total (pounds)	489,393,131			500,015,845			450,251,489		

[a] Represents the product of only one or two manufacturers, and is included in item "Not segregated," at bottom of column.
[b] Kegs of 25 pounds each.
[c] Pounds.

Digitized by Google
Original from PRINCETON UNIVERSITY

Generated on 2024-09-28 15:41 GMT / https://hdl.handle.net/2027/njp.32101054990427
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

TABLE 2.—*Amount of* ***black blasting powder*** *used in the United States during 1913 and 1914, classified by use.*

[Kegs of 25 pounds each.]

Groups of States.	Black blasting powder, 1913.				Black blasting powder, 1914.			
	Coal mining.	Other mining.	Railway and other construction work.	All other purposes.	Coal mining.	Other mining.	Railway and other construction work.	All other purposes.
	Kegs.	*Kegs.*	*Kegs.*	*Kegs.*	*Kegs.*	*Kegs.*	*Kegs.*	*Kegs.*
Group 1. Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont	.....	802	362	26,940	.....	12	521	21,262
Group 2. Connecticut, New Jersey, and New York	.....	2,249	7,660	36,304	.....	2,900	2,311	34,337
Group 3. Delaware, District of Columbia, Maryland, and Virginia	124,239	2,000	46,746	47,933	103,250	1,359	20,934	22,436
Pennsylvania	2,535,098	19,596	74,359	214,290	2,477,542	16,237	68,063	158,708
West Virginia	614,392	5,000	11,115	38,377	566,692	6,304	20,375	18,446
Group 4. Florida, Georgia, North Carolina, and South Carolina	7,900	2,939	33,710	17,227	5,400	3,178	8,201	12,637
Group 5. Indiana and Kentucky	762,815	3,629	16,408	40,324	764,368	5,665	7,640	33,325
Illinois	1,269,974	828	1,175	22,305	1,195,026	5	533	10,072
Ohio	305,581	16,906	686	24,201	192,097	33,376	2,390	18,864
Group 6. Alabama, Mississippi, and Tennessee	315,942	12,022	55,213	88,581	247,327	18,608	26,043	14,959
Group 7. Michigan, Minnesota, and Wisconsin	21,421	191,908	2,426	8,846	28,999	140,150	2,798	10,033
Group 8. Iowa, Kansas, Missouri, and Nebraska	875,691	10,108	16,942	51,288	941,702	8,654	16,934	43,427
Group 9. Arkansas, Louisiana, Oklahoma, and Texas	309,390	2,297	20,035	28,996	294,177	5,593	7,855	22,259
Group 10. Montana, North Dakota, South Dakota, and Wyoming	161,082	2,280	35,462	34,319	158,270	2,550	14,209	32,250
Group 11. Colorado, New Mexico, and Utah	82,416	40,604	95,284	45,998	84,541	37,065	13,502	27,399
Group 12. Alaska, Idaho, Oregon, and Washington	9,940	60	51,886	48,932	13,115	3	29,303	31,854
Group 13. Arizona, California, and Nevada	802	20,786	157,005	65,489	.....	21,226	74,519	40,198
Total (kegs)	7,396,683	334,014	626,474	840,410	7,072,506	302,885	316,131	552,466
Grand total (kegs)	9,197,581				8,243,988			

Digitized by Google
Original from PRINCETON UNIVERSITY

Generated on 2024-09-28 15:26 GMT / https://hdl.handle.net/2027/njp.32101054990427
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

TABLE 3.—*Amount of* ***high explosives*** *used in the United States during 1913 and 1914, classified by use.*

Groups of States.	High explosives other than permissible explosives, 1913.[a]				High explosives other than permissible explosives, 1914.			
	Coal mining.	Other mining.	Railway and other construction work.	All other purposes.	Coal mining.	Other mining.	Railway and other construction work.	All other purposes.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Group 1. Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont	.....	26,850	1,006,716	1,880,985	.....	35,100	904,814	1,670,681
Group 2. Connecticut, New Jersey, and New York	.....	2,205,428	6,207,383	6,992,453	.....	2,647,617	3,798,340	6,543,149
Group 3. Delaware, District of Columbia, Maryland, and Virginia	471,475	345,000	1,217,897	3,098,075	286,500	317,125	1,074,051	3,153,751
Pennsylvania	18,198,494	217,270	5,671,290	12,445,861	19,204,406	562,980	4,148,180	10,893,138
West Virginia	645,425	8,500	1,454,400	2,426,075	510,725	12,400	1,599,256	1,999,849
Group 4. Florida, Georgia, North Carolina, and South Carolina	5,680	327,585	1,537,722	3,648,556	2,800	409,235	1,244,755	3,304,685
Group 5. Indiana and Kentucky	699,201	57,400	1,594,900	3,788,208	208,734	31,425	869,129	3,768,630
Illinois	172,300	802,650	542,917	5,171,823	143,450	814,350	517,250	4,785,071
Ohio	62,360	378,625	300,750	6,530,388	547,700	325,750	217,900	7,724,605
Group 6. Alabama, Mississippi, and Tennessee	722,610	3,823,346	3,459,695	2,836,829	913,775	3,280,606	1,701,350	2,160,867
Group 7. Michigan, Minnesota, and Wisconsin	20,125	30,337,337	415,452	8,027,723	31,900	26,912,667	529,100	8,382,549
Group 8. Iowa, Kansas, Missouri, and Nebraska	1,430,550	13,089,350	503,610	6,168,136	1,076,450	11,645,412	829,395	5,582,169
Group 9. Arkansas, Louisiana, Oklahoma, and Texas	455,050	1,218,500	473,458	4,056,083	665,770	649,750	651,849	3,489,594
Group 10. Montana, North Dakota, South Dakota, and Wyoming	145,975	8,084,080	968,125	2,240,415	154,150	7,592,115	408,185	1,461,278
Group 11. Colorado, New Mexico, and Utah	615,670	7,975,945	1,307,380	5,538,450	243,760	6,381,865	500,105	5,211,747
Group 12. Alaska, Idaho, Oregon, and Washington	473,568	6,689,920	3,375,148	10,177,150	225,825	6,518,435	4,885,672	7,966,259
Group 13. Arizona, California, and Nevada	24,650	16,508,640	3,136,962	7,945,970	.....	16,127,745	4,104,615	3,891,481
Total (pounds)	24,143,133	92,096,426	33,173,805	92,973,180	24,215,945	84,264,577	27,983,946	81,989,503
Grand total (pounds)	242,386,544				218,453,971			

[a] Revised from statement in Technical Paper 85, Bureau of Mines.

Digitized by Google
Original from PRINCETON UNIVERSITY

Generated on 2024-09-28 15:30 GMT / https://hdl.handle.net/2027/njp.32101054990427
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

TABLE 4.—*Amount of* ***permissible explosives*** *used in the United States during 1913 and 1914, classified by use.*

Groups of States.	Permissible explosives, 1913.				Permissible explosives, 1914.			
	Coal mining.	Other mining.	Railway and other construction work.	All other purposes.	Coal mining.	Other mining.	Railway and other construction work.	All other purposes.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Group 1. Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont	.....	.....	27,900	5,000	.....	.....	.....	1,050
Group 2. Connecticut, New Jersey, and New York	.....	461,700	2,000	28,700	.....	333,100	500	2,997
Group 3. Delaware, District of Columbia, Maryland, and Virginia	134,000	17,500	.....	19,650	441,825	6,000	.....	74,075
Pennsylvania	9,622,475	5,000	16,400	192,175	8,989,625	.....	34,175	184,800
West Virginia	3,282,560	20,000	.....	195,900	2,904,449	21,550	.....	310,100
Group 4. Florida, Georgia, North Carolina, and South Carolina	.....	1,850	.....	8,150	.....	900	.....	4,430
Group 5. Indiana and Kentucky	482,250	300	5,850	60,900	564,525	20,800	.....	55,898
Illinois	1,569,175	.....	.....	9,750	1,327,575	200	.....	16,600
Ohio	6,650	2,950	.....	11,000	11,200	3,225	.....	16,350
Group 6. Alabama, Mississippi, and Tennessee	4,481,975	114,590	.....	26,639	2,982,363	191,416	52,600	70,256
Group 7. Michigan, Minnesota, and Wisconsin	.....	2,000	.....	13,400	.....	2,500	.....	76,279
Group 8. Iowa, Kansas, Missouri, and Nebraska	21,125	471,800	200	76,254	15,237	279,750	25,050	45,150
Group 9. Arkansas, Louisiana, Oklahoma, and Texas	356,500	41,850	1,525	1,775	396,700	41,600	750	15,850
Group 10. Montana, North Dakota, South Dakota, and Wyoming	252,625	42,140	2,800	9,200	261,850	30,600	.....	7,800
Group 11. Colorado, New Mexico, and Utah	1,381,950	3,472,500	272,900	62,887	1,534,900	3,817,200	68,700	89,550
Group 12. Alaska, Idaho, Oregon, and Washington	167,600	3,950	15,000	.....	163,643	8,000	.....	1,000
Group 13. Arizona, California, and Nevada	45,400	77,350	80,000	50	.....	93,400	99,650	75
Total (pounds)	21,804,285	4,735,480	424,575	721,430	19,593,892	4,850,241	281,425	972,260
Grand total (pounds)	27,685,770				25,697,818			

Digitized by Google
Original from PRINCETON UNIVERSITY

TABLE 5.— *Yearly sales of short-flame explosives used in coal mines in the United States, 1901–1914.*

Year.	Quantity sold.	Year.	Quantity sold.
	Pounds.		*Pounds.*
1901		1908	2,108,610
1902	11,300	1909	8,942,857
1903	288,661	1910	11,820,836
1904	608,270	1911	13,428,239
1905	1,031,300	1912	18,150,618
1906	1,533,575	1913	21,804,285
1907	2,095,244	1914	19,593,892

TABLE 6.—*Quantity of permissible explosives used in different coal fields in the United States, 1910–1914.*

Coal fields and regions.	1910	1911	1912	1913	1914
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
1. Pennsylvania anthracite field	1,486,100	1,917,412	2,177,172	3,294,225	4,380,635
2. Northern Appalachian region [a]	5,967,216	6,350,272	9,190,025	9,744,810	7,966,464
3. Southern Appalachian region	3,188,785	3,377,268	3,995,485	4,481,975	3,510,013
4. Eastern interior field	165,975	337,012	751,005	2,058,075	1,364,450
5. Western interior field	196,560	255,050	440,825	377,625	411,937
6. Rocky Mountain region	808,200	1,177,075	1,473,129	1,634,575	1,796,750
7. Pacific coast region	8,000	14,150	122,977	213,000	163,643
Total	11,820,836	13,428,239	18,150,618	21,804,285	19,593,892

[a] Not including Pennsylvania anthracite field.

TABLE 7.—*Coal-mine fatalities due to explosives during 1912, 1913, and 1914.*

States.	1912	1913	1914
Pennsylvania	83	79	97
West Virginia	6	8	5
Illinois	10	11	9
Ohio	6	6	2
Indiana, Michigan, and Kentucky	3	5	12
Alabama, Mississippi, Tennessee, Georgia, and North Carolina	5	2	2
Iowa, Kansas, and Missouri	5	6	4
Colorado, New Mexico, and Utah	1	7	4
Maryland and Virginia	10	2	.....
Montana, North Dakota, and Wyoming	2	4	4
Arkansas, Oklahoma, and Texas	1	5	4
Alaska, California, Idaho, Nevada, Oregon, and Washington	1	3	3
Total	133	138	146

Generated on 2024-09-28 15:25 GMT / https://hdl.handle.net/2027/njp.32101054990427
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from PRINCETON UNIVERSITY

Generated on 2024-09-28 15:24 GMT / https://hdl.handle.net/2027/njp.32101054990427
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

TABLE 8.—*Fatalities in coal mines caused by explosives.*[a]

State.	Period.	Handling and transportation.	Handling caps, detonators, squibs, and fuse.	Thawing explosives.	Tamping.	Premature blast and short fuse.	Blown out or windy shot.	Flying pieces of rock or coal.	Returned too soon.	Delayed blast.	Shot breaking through pillar or rib.	Suffocation by powder gas.	Striking unexploded charge in removing débris.	Drilling into unexploded charge.	Miscellaneous.	Total.
Alabama	1894–1913	7	.....	.....	2	9	12	8	16	1	2	1	.....	.....	28	**86**
Arkansas	1905–1913	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	15	**15**
Colorado	1887–1912	2	2	.....	.....	18	3	4	2	2	1	6	.....	9	7	**56**
Georgia	1903–1913	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	**1**
Illinois	1882–1912	86	1	.....	10	95	81	48	52	3	32	7	.....	14	25	**454**
Indiana	1891–1913	23	.....	.....	3	30	16	6	13	3	12	19	.....	2	11	**138**
Iowa	1881–1912	17	1	.....	2	20	4	26	5	1	4	1	.....	3	6	**90**
Kansas	1885–1912	14	9	.....	1	12	21	23	5	.....	4	30	.....	.....	19	**138**
Kentucky	1884–1913	13	5	.....	.....	11	17	3	13	1	7	6	.....	5	10	**91**
Maryland	1883–1913	3	1	.....	.....	1	.....	.....	1	.....	.....	.....	.....	.....	.....	**6**
Michigan	1900–1913	.....	1	.....	.....	6	.....	2	.....	1	1	1	.....	.....	3	**15**
Missouri	1889–1913	3	.....	.....	.....	4	.....	8	8	2	5	8	.....	1	4	**43**
Montana	1891–1913	2	.....	1	.....	.....	.....	1	3	.....	4	1	.....	.....	3	**15**
New Mexico	1893–1912	.....	.....	.....	.....	4	5	5	1	2	1	1	.....	2	.....	**21**
North Dakota	1908–1913	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	2	**3**
Ohio	1874–1912	19	2	.....	.....	47	1	12	9	3	27	11	.....	.....	42	**173**
Oklahoma	1893–1912	16	1	.....	.....	9	19	14	10	3	6	6	.....	.....	27	**111**
Oregon	1903–1913	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pennsylvania (anthracite)	1870–1912	320	10	24	89	570	.....	397	125	7	76	8	3	26	105	**1,760**
Pennsylvania (bituminous)	1877–1912	50	6	1	2	34	13	30	19	1	24	3	.....	3	2	**188**
Tennessee	1891–1913	3	.....	.....	.....	2	5	2	4	.....	3	5	.....	.....	25	**49**
Texas	1909–1913	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	**2**
Utah	1892–1913	1	.....	.....	.....	3	.....	1	.....	.....	.....	.....	.....	.....	.....	**5**
Virginia	1900–1913	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10	**10**
Washington	1886–1912	2	2	2	.....	1	.....	.....	1	2	1	15	.....	3	3	**32**
West Virginia	1890–1912	54	4	2	3	29	6	2	7	.....	9	1	.....	1	29	**147**
Wyoming	1908–1912	1	.....	.....	.....	2	.....	.....	6	.....	1	.....	.....	2	.....	**12**
Total		**636**	**45**	**30**	**112**	**908**	**203**	**592**	**300**	**32**	**220**	**130**	**3**	**71**	**379**	**3,661**
Percentage of total		17.37	1.23	0.82	3.06	24.80	5.55	16.17	8.19	0.88	6.01	3.55	0.08	1.94	10.35	100

[a] Compiled from the annual reports of the State mine inspectors.

Digitized by Google
Original from PRINCETON UNIVERSITY

PUBLICATIONS ON EXPLOSIVES FOR MINING AND ACCIDENTS THEREFROM.

A limited supply of the following publications of the Bureau of Mines is temporarily available for free distribution. Requests for all publications can not be granted, and applicants should limit their selection to publications that may be of especial interest to them. Requests for publications should be addressed to the Director, Bureau of Mines, Washington, D. C.:

BULLETIN 10. The use of permissible explosives, by J. J. Rutledge and Clarence Hall. 1912. 34 pp., 5 pls., 4 figs.

BULLETIN 15. Investigations of explosives used in coal mines, by Clarence Hall, W. O. Snelling, and S. P. Howell, with a chapter on the natural gas used at Pittsburgh, by G. A. Burrell, and an introduction by C. E. Munroe. 1911. 197 pp., 7 pls., 5 figs.

BULLETIN 17. A primer on explosives for coal miners, by C. E. Munroe and Clarence Hall. 61 pp., 10 pls., 12 figs. Reprint of United States Geological Survey Bulletin 423.

BULLETIN 48. The selection of explosives used in engineering and mining operations, by Clarence Hall and S. P. Howell. 1913. 50 pp., 3 pls., 7 figs.

BULLETIN 51. The analysis of black powder and dynamite, by W. O. Snelling and C. G. Storm. 1913. 80 pp., 5 pls., 5 figs.

BULLETIN 59. Investigations of detonators and electric detonators, by Clarence Hall and S. P. Howell. 1913. 73 pp., 7 pls., 5 figs.

BULLETIN 66. Tests of permissible explosives, by Clarence Hall and S. P. Howell. 1913. 313 pp., 1 pl., 6 figs.

BULLETIN 69. Coal-mine accidents in the United States and foreign countries, compiled by F. W. Horton. 1913. 102 pp., 3 pls., 40 figs.

TECHNICAL PAPER 6. The rate of burning of fuse as influenced by temperature and pressure, by W. O. Snelling and W. C. Cope. 1912. 28 pp.

TECHNICAL PAPER 7. Investigations of fuse and miners' squibs, by Clarence Hall and S. P. Howell. 1912. 19 pp.

TECHNICAL PAPER 12. The behavior of nitroglycerin when heated, by W. O. Snelling and C. G. Storm. 1912. 14 pp., 1 pl., 2 figs.

TECHNICAL PAPER 17. The effect of stemming on the efficiency of explosives, by W. O. Snelling and Clarence Hall. 1912. 20 pp., 11 figs.

TECHNICAL PAPER 18. Magazines and thaw houses for explosives, by Clarence Hall and S. P. Howell. 1912. 34 pp., 1 pl., 5 figs.

TECHNICAL PAPER 30. Mine-accident prevention at Lake Superior iron mines, by D. E. Woodbridge. 1913. 38 pp., 9 figs.

TECHNICAL PAPER 40. Metal-mine accidents in the United States during the calendar year 1911, compiled by A. H. Fay. 1913. 54 pp.

TECHNICAL PAPER 46. Quarry accidents in the United States during the calendar year 1911, compiled by A. H. Fay. 1913. 32 pp.

TECHNICAL PAPER 48. Coal-mine accidents in the United States, 1896–1912, with monthly statistics for 1912, compiled by F. W. Horton. 1913. 74 pp., 10 figs.

TECHNICAL PAPER 52. Permissible explosives tested prior to March 1, 1913, by Clarence Hall. 1913. 11 pp.

TECHNICAL PAPER 61. Metal-mine accidents in the United States during the calendar year 1912, compiled by A. H. Fay. 1913. 76 pp., 1 fig.

TECHNICAL PAPER 67. Mine signboards, by Edwin Higgins and Edward Steidle. 1913. 15 pp., 1 pl., 4 figs.

Generated on 2024-09-28 15:24 GMT / https://hdl.handle.net/2027/njp.32101054990427
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from PRINCETON UNIVERSITY

TECHNICAL PAPER 69. Production of explosives in the United States in the calendar year 1912, compiled by A. H. Fay. 8 pp.

TECHNICAL PAPER 71. Permissible explosives tested prior to January 1, 1914, by Clarence Hall. 1914. 12 pp.

TECHNICAL PAPER 73. Quarry accidents in the United States during 1912, compiled by A. H. Fay. 1914. 45 pp.

TECHNICAL PAPER 85. Production of explosives in the United States during 1913, compiled by A. H. Fay. 1914. 15 pp.

TECHNICAL PAPER 92. Quarry accidents in the United States during the calendar year 1913, compiled by A. H. Fay. 1914. 76 pp.

TECHNICAL PAPER 94. Metal-mine accidents in the United States during the calendar year 1913, compiled by A. H. Fay. 1914. 73 pp.

TECHNICAL PAPER 100. Permissible explosives tested prior to March 1, 1915, by S. P. Howell. 1915. 16 pp.

MINERS' CIRCULAR 3. Coal-dust explosions, by G. S. Rice. 1911. 22 pp.

MINERS' CIRCULAR 6. Permissible explosives tested prior to January 1, 1912, and precautions to be taken in their use, by Clarence Hall. 1912. 20 pp.

MINERS' CIRCULAR 7. Use and misuse of explosives in coal mining by J. J. Rutledge, with a preface by J. A. Holmes. 1913. 52 pp., 8 figs.

MINERS' CIRCULAR 13. Safety in tunneling, by D. W. Brunton and J. A. Davis. 1913. 19 pp.

Generated on 2024-09-28 15:24 GMT / https://hdl.handle.net/2027/njp.32101054990427
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from PRINCETON UNIVERSITY